DOCUMENT RESUME

ED 172 481 EC 114 848

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TITLE Behavior Modification of Retarded Preschool Children.
INSTITUTION Tokyo Gakugei Univ. (Japan). Research Inst. for the Education of Exceptional Children.
PUB DATE Nov 77
NOTE 18p.
JOURNAL CIT RIEEC Research Bulletin; n8 Nov 1977

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Autism; *Behavior Change; *Behavior Problems; *Downs Syndrome; *Exceptional Child Research; *Operant Conditioning; *Positive Reinforcement; Preschool Children

ABSTRACT

In a study of behavior modification two Down's syndrome preschool children, the first a 5-year-old boy with autistic behavior patterns and the second a 4-year-old girl whose behavior problem was to reject other children, were examined. The first S was engaged in ball catching activities with a teacher with positive reinforcement (playing the S's favorite music) for returning the ball to the space between the teacher's legs. The activities lasted for a 1-year period, at which time the S was actively playing catch with his teacher. Among conclusions were that the S's autistic behavior patterns were remarkably modified and the reinforcement function was verified. The second S was engaged in trampoline play with a teacher and the first S. Positive reinforcement (praise, physical contact) was given for target behaviors (such as laughing, giving the first S a toy, or touching him). Results after 20 sessions showed that the second S's approach behavior had changed considerably. (Tables of S responses are included.) (PHR)

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ED172481

ISSN 0385-9428

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Working Paper Series

# RESEARCH BULLETIN

*the Research Institute for the Education of Exceptional Children*

## Behavior Modification of Retarded Preschool Children

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RRB-8
November 1977

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RRB-3

# Behavior Modification of Retarded Preschool Children

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# Behavior Modification of Retarded Preschool Children

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Operant principles were applied to two retarded preschool children. They were a five year old Down's Syndrome boy with autistic behavior patterns and a four year old Down's Syndrome girl whose behavior problem was to reject other children. In both cases, their problem behavior patterns were much improved.

## CASE 1

Subject : The status of the subject, T, as of April, 1974 was as follows : boy, CA 5.5, serious developmental retardation, Down's syndrome (21 trisomy), autistic behavior patterns.

Case History : The subject's weight at birth was 2,504 grams. His neck set at 4.5 months, crawling began at one and a half years and walking at two. At the time the experiment began semi-liquid food was given and toilet training had not yet been established. Comprehensive help was required for daily life such as dressing oneself or eating.

Behavioral Characteristics : T constantly rocked back and forth and hit his forehead and chin against the floor. He was hyperactive. He was obsessed with a certain quality and thickness of paper and whenever he obtained a book, he sat and turned the pages with his chin and hands. If he was deprived of his books, the

above mentioned behaviors occurred frequently. He was uninterested in food, toys and people other than his parents, brother and certain books. His language consisted of the syllables "daa, daa, gaa, gaa".

Experimental situation - Stage One : Teacher and assistant

The experiment took place in a playroom (21 $m^2$) in our University Research Institute. The teacher and T stretched their legs forward face to face on the tatami (straw mat) part of the room (6 $m^2$), and engaged in a game of catch. A soft, light ball made of leather, the size of a basketball, was used. The teacher engaged in the giving and receiving of the ball by saying, "Here goes the ball." or, "T, throw the ball." to the subject and giving him behavioral stimuli. When the ball was returned to the teacher she clapped her hands and gave the subject social reinforcement by saying things like, "You did well." The assistant stayed behind the subject and, when the child moved, she carried him back to his previous position and helped him to engage in the ball game. The desired response was to have T throw the ball within the space made by the teacher's legs.

Observation and Recording : The observer, watching through a one-way screen checked the responses of the child to the teacher's stimuli on a special form during the ten minute training period. He recorded whether there was help from the assistant as well as spontaneous behaviors of the child. The ratio of the number of T's responses to the number of times the ball was thrown by the teacher and the changes in the number of correct responses per ten-minute period were recorded.

Reinforcement : Based on the results of the preliminary experiments and on information from his mother, the song "The Toy's Cha-Cha" was played on a cassette recorder as a reinforcer. Immediately after the ball was thrown correctly in the direction of the teacher, approximately four measures of the music were played. If the child showed benaviors such as throwing the ball to the side, laying his face down on the floor, or moving around, the music was not played. Stage One involved 16 sessions from May to September 1974.

Experimental Situation - Stage Two : Teacher and Assistant

The same room as in Stage One was used but the place was moved from the tatami to the floor part of the room. He was seated at the edge of the tatami and engaged in the ball game. The same music reinforcer was used. Correct responses were considered to be throwing the ball toward the teacher while sitting at the edge of the tatami or while standing on the floor.

Observation and Recording : Observation and recording were done in the same manner as in Stage One with the addition of recording separately the response of whether T was seated or standing when he threw the ball.

Duration : Stage Two involved 41 sessions between October, 1974 and March, 1975.

Experimental Situation - Stage Three

T is now standing up and actively playing catch with one teacher. He is obviously enjoying the game and still likes the song.

Results of Stage One and Discussion

Changes in the rate of correct responses of T's throwing of the ball during the experimental period are shown in Figure 1 (a-b). The response rate during the baseline period decreased from 44% to 41% and then to 31%, but increased rapidly during the reinforcement period. This fact suggests that the music reinforcement was effective, but this has not yet been verified at this first stage.

Development : At the end of Stage One, T could respond to the teacher's instructions to some extent. He often stood up during play and threw the ball. He could continue to play catch for more than 8 minutes. He began to get interested in other toys and his interest in books and turning pages in books decreased. The second stage of the experiment was carried out in order to expand the "ball game play" of the first experimental stage to a more generalized ball game play.

Results of Stage Two and Discussion

Changes in the subject's response rate are shown in Figure 1 (c-d). During sessions 1-11, the rate of correct responses averaged around 80% and was stable. After both sessions 12-13 and 35-37, which were extinction sessions, the rate of correct responses increased rapidly and was maintained at the 80% - 100% level. It can be concluded that the reinforcement function of the music was established.

Conclusions and Future Problems

1) The subject's responses to the ball game increased remarkably during the experiment.

2) Observation of his free play other than in the experimental situation and of his behavior during the snack period confirmed that the subject's autistic behavior patterns were also remarkably modified.

3) The reinforcement function of the music was virtually verified during the second stage of the experiment.

4) T entered a special school in April, 1975. He had a lot of difficulty participating in a group, but somehow participated in the learning activities. Since April, 1975 he has been visiting our Research Institute once a week and Stage Three (playing catch while standing up all the time) and Stage Four (playing catch with two teachers) were carried out successfully. In March, 1977 he could play catch very well and in a pleasant manner with either several teachers or with handicapped children. He would play out in the field only with social reinforcement. We are now planning to teach him how to follow teachers' verbal instructions.

## CASE II

Subject : The status of the subject, M, as of April 1, 1974 was as follows : girl, CA 4.5, serious developmental retardation, Down's Syndrome (21 trisomy), cardiac ventricle septum deficiency.

Case History : At the time of birth, the subject's inhalation ability was weak, and she was hospitalized for a month. At three months, six months and nine months after the birth, she was hospitalized because of pneumonia. At the age of one

year and 5 months, she underwent a duodenum stricture operation. She was also hospitalized twice for colds after the above operation.

Behavioral Characteristics : She often imitated other people's behavior and had the characteristics of Down's Syndrome children, such as moving in rhythm with songs. She demonstrated great frustration if her demands were not met. She would approach no persons other than those who looked like her father, who wears glasses. A special distinguishing feature was that she rejected other handicapped children.

Development : She was brought to our Institute in January, 1973, and she began to walk by herself after six months as a result of walking training. Her rejective behavior, especially toward other children, became a problem as her behavioral sphere was expanded after she was able to walk.

## Experimental Situation and the Teacher

In the playroom (21 $m^2$), while the teacher and T (previously discussed) were playing on a trampoline with music, the teacher gave a stimulus (verbal, physical or both) to M which would urge M to approach T by saying, "Come, and play with us." or "M, push the trampoline." The toys used were a trampoline and a cassette tape of the song "Officer Dog".

## Classification and Definition of Responses which were to be Observed

M's responses which were to be observed and their definitions are shown in Table I.

The instructions and reinforcement stimuli (language, movements or both)

given to M by the teacher were observed and recorded.

Observation and Recording : Two observers in the observation room next to the playroom watched the aforementioned behavior through a one-way screen for 15 minutes, keeping a record at 15-second intervals on special recording sheets.

The reliability of the two observers was calculated by using the formula,

$$R = \frac{\text{No. of Agreements}}{\text{No. of Agreements} + \text{No. of Disagreements}} \times 100$$

During the preliminary stage of the experiment, in order to increase reliability, the definitions of the responses to be observed were scrutinized. During the base-line period, the reliability was more than 90 %.

Reinforcement Procedure : Social reinforcement from the teacher (praise, physical contact) was considered to be the reinforcer, and every response related to the target behaviors (laughing, clapping her hands, approaching T, giving him a toy, or touching him) was immediately reinforced.

Experimental Period : 20 sessions between May and September 1974.

Experimental Procedure : As follows :

First Baseline Period (B1) - 3 sessions.

First Reinforcement Period (R1) - 4 sessions. Social reinforcement was given by the teacher to M's behaviors which involved approaching T.

Second Baseline Period (B2) - 4 sessions.

Second Reinforcement Period (R2) - 6 sessions.

Generalization Period (G) - 3 sessions.

Results and Discussion

Figure 2 shows the number of M's spontaneous approaches to T (Type 1 plus Type 2 (see Table 1) ) and the number of M's rejection responses to T's approach. Figure 3 shows the approach behaviors divided into Type 1 and Type 2 responses.

While the rate of rejective responses to directions by the teacher during B1 increased from 10 % to 25 % and then to 64 %, the approach response rate decreased from 30 % to 0 %. During periods B2 and R2, the same kinds of tendencies as seen in B1 and R1 were found, and it was seen that the teacher's social reinforcement during the reinforcement periods functioned effectively. By dividing the approach responses into Type 1 and Type 2 approach responses, it was found that Type 2 approach responses which were not observed during B1, appeared for the first time during the R1 period and increased during the R2 period. M's approach behaviors toward T at the beginning of the experiment were passive responses such as watching, laughing or clapping her hands, but once the experiment entered the reinforcement period. they changed to positive responses such as pushing the trampoline or playing on it together.

The number of M's spontaneous approach responses was greater during period R1 than B1, and greater during period R2 than B2, whereas rejective responses were distributed in the opposite direction (Fig. 2). Type 2 approach responses which could not be found during period B1, grew remarkably during R1, and after a decrease during B2, increased again remarkably during R2, becoming far more frequent than Type 1 approaches. Thus, M's approach behaviors toward

T changed in quality. This was also verified by the cumulative record of the amount of time spent in spontaneous approach responses (Figure 4).

The amount of time was calculated by the formula :

(no. of 15 sec. frames in which Type 2 approach responses were observed - 1 ) x 15 sec.

During the generalization period (G), it was shown that M's responses to T had been changed to a considerable degree. Especially in the last session of G, as shown in Figure 4, it was noteworthy that most of the 15 minute session was spent in Type 2 approach responses.

ACKNOWLEDGEMENT

The author appliciates the help of Ms. K. Abe in this study.

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Table 1 : M's responses to be observed and their definitions

| | Items | Definitions |
|---|---|---|
| M's Responses | Rejective | Rejective responses such as shaking her head or hand in denial, crawling backward on her knees, or saying "No." |
| | Neutral | No rejective responses but ignores the instructions. |
| | Approach - Type 1 | Laughing, clapping her hands or singing song, etc., towards T at more than 1 meter from T. |
| | Approach - Type 2 | Responses mentioned above at less than 1 meter from T. |

FIG. I

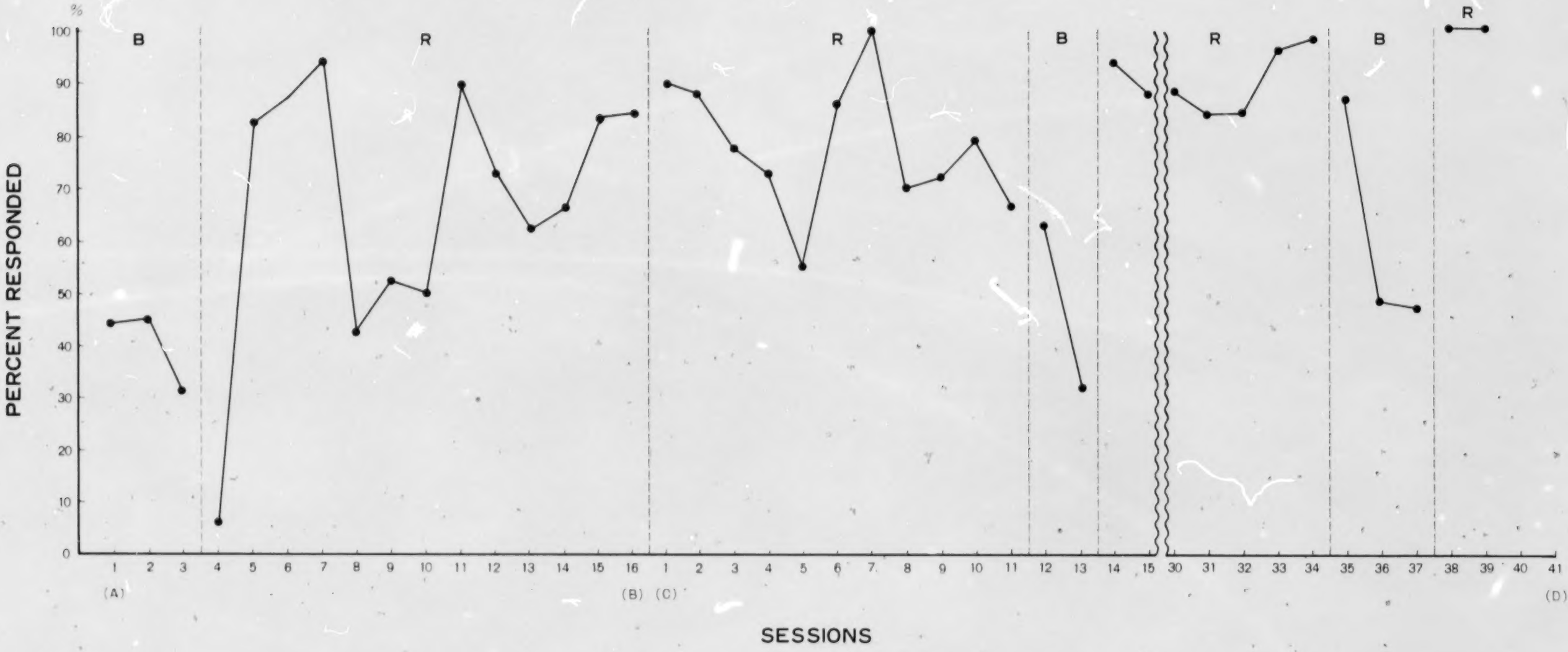

%
PERCENT RESPONDED
100
90
80
70
60
50
40
30
20
10
0
B
R
R
B
R
B
R
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 30 31 32 33 34 35 36 37 38 39 40 41
(A)
(B) (C)
(D)
SESSIONS

FIG. 2

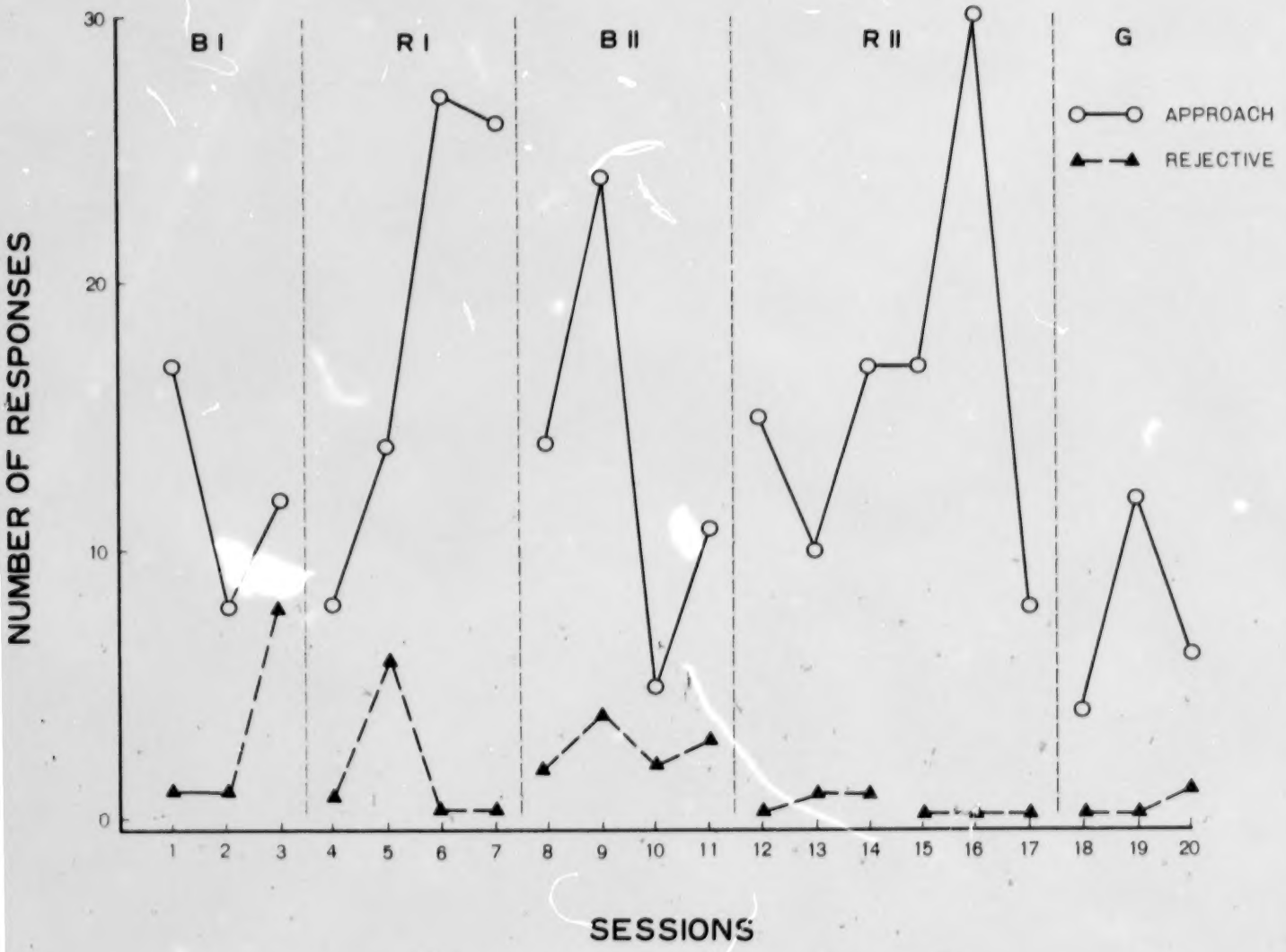

B I
R I
B II
R II
G
APPROACH
REJECTIVE
NUMBER OF RESPONSES
SESSIONS
0
10
20
30
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

FIG. 3

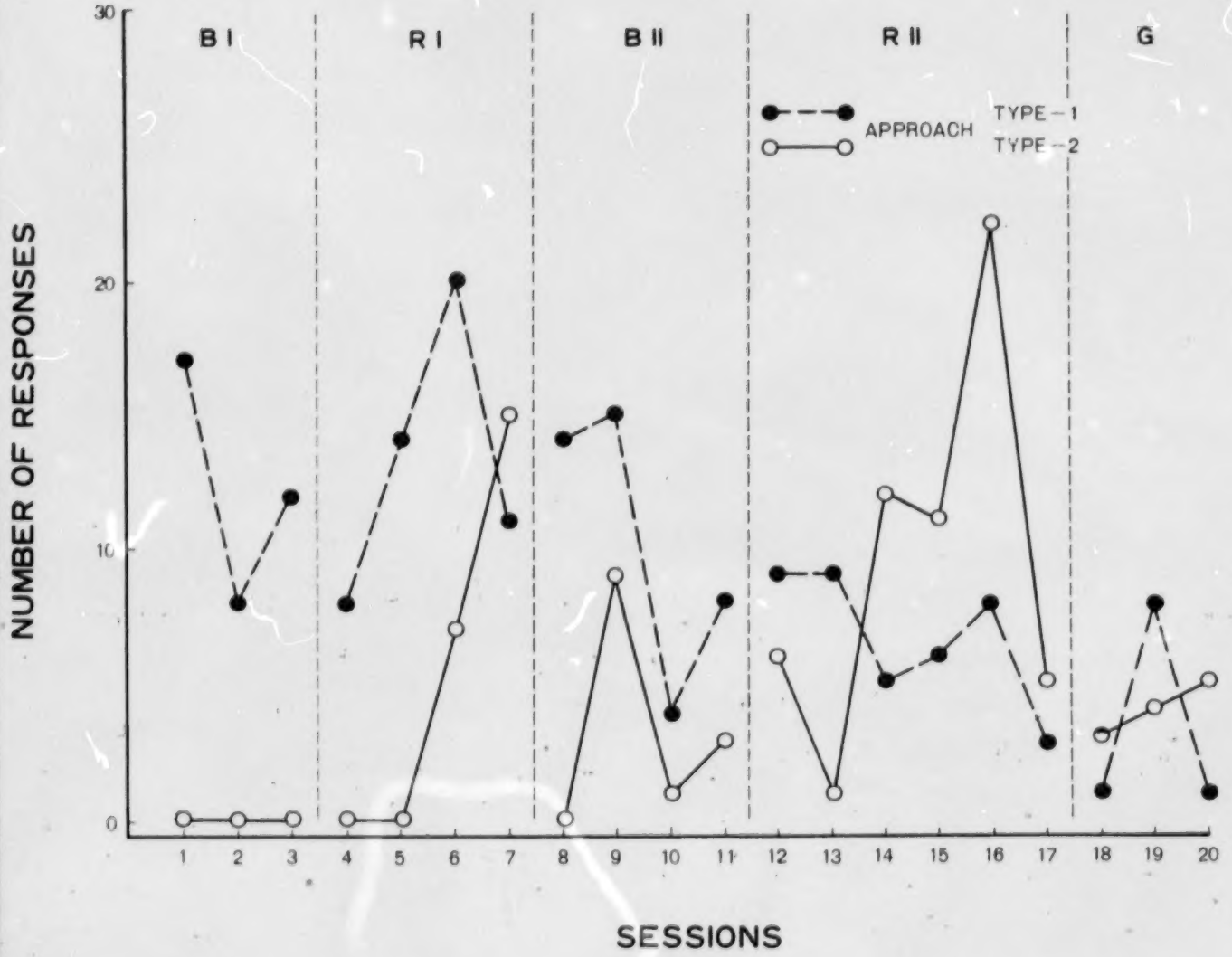
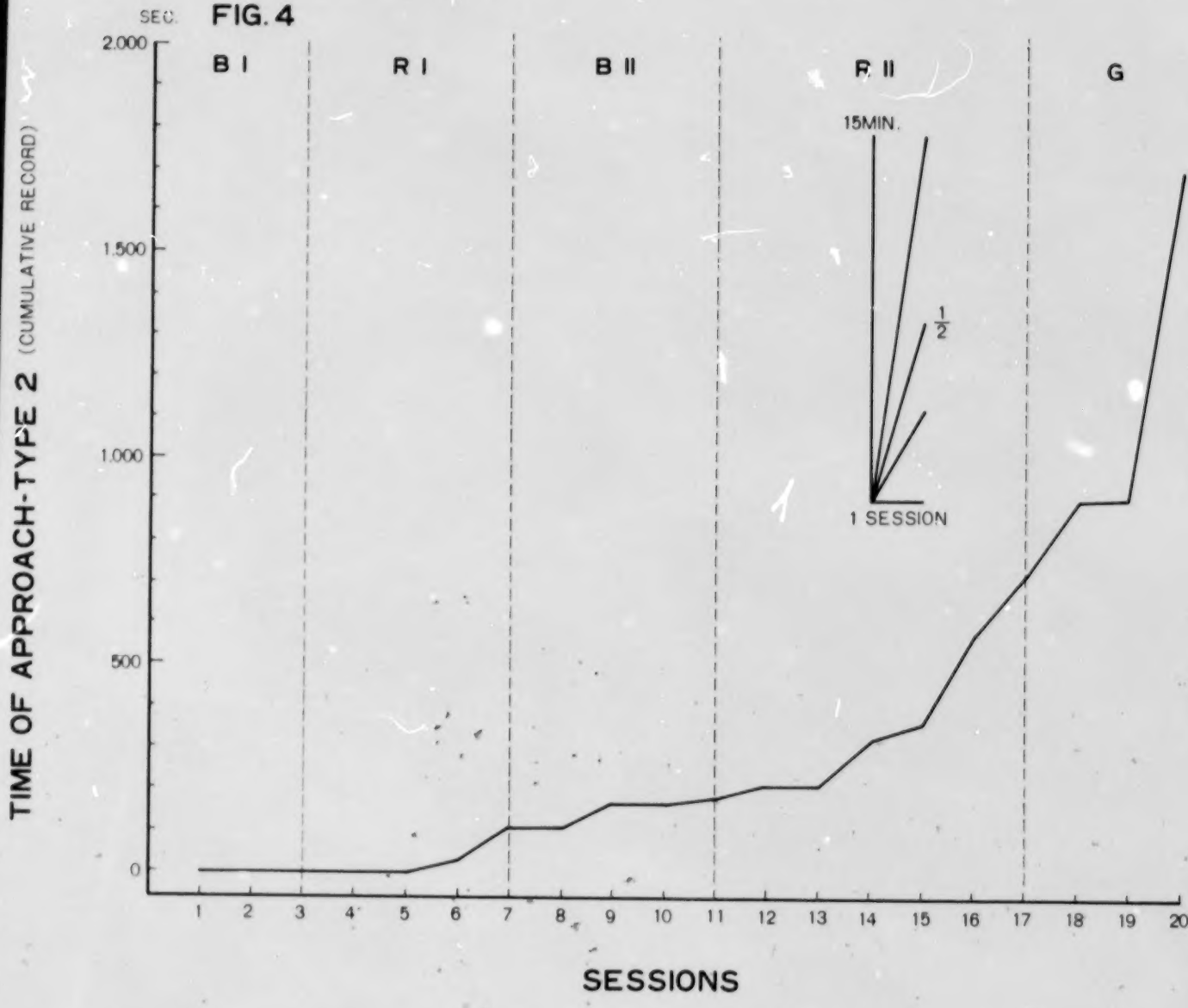

B I
R I
B II
R II
G
APPROACH
TYPE – 1
TYPE – 2
NUMBER OF RESPONSES
SESSIONS
0
10
20
30
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

FIG. 4


SEC.
2.000
1.500
1.000
500
0
B I
R I
B II
R II
G
15MIN.
1/2
1 SESSION
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
SESSIONS
TIME OF APPROACH-TYPE 2 (CUMULATIVE RECORD)